Our Docket No.: 042390.P3674R

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

O'Connor

Application No.: 09/976,912

Filed: May 14, 2002

For: Cooling System for Thin Profile Electronic and Computer Devices

Examiner: Vortman, Anatoly

Art Group: 2835

APPEAL BRIEF
IN SUPPORT OF APPELLANT'S APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

Applicant (hereinafter "Appellant") hereby submits this Brief in support of its appeal from a final decision by the Examiner, mailed July 14, 2005, in the above-referenced Application. Appellant respectfully requests consideration of this appeal by the Board of Patent Appeals and Interferences (hereinafter "Board") for allowance of the above-captioned patent application.

An oral hearing is not desired.

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I. REAL PARTY IN INTEREST

The invention is assigned to Intel Corporation of 2200 Mission College Boulevard, Santa Clara, California 95052.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellant's knowledge, there are no appeals or interferences related to the present appeal that will directly affect, be directly affected by, or have a bearing on the Board's decision.

III. STATUS OF THE CLAIMS

Claims 1-32, 35-42, 45-48 and 52 are currently pending in the above-referenced application. No claims have been allowed. Claims 1-32, 35-42, 45-48 and 52 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

The Final Office Action, mailed December 22, 2005, rejected claims 1-32, 35-42, 45-48 and 52. A copy of all claims on appeal is attached hereto as an Appendix of Claims.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

According to one embodiment, an apparatus for removing heat from a heat generating component is disclosed. The apparatus includes a heat pipe having an evaporator portion and a condenser portion wherein the heat generating component is thermally coupled to the evaporator portion. **See Figure 5, 71 and 72.** The apparatus also includes an air duct comprising a housing having internal fins and a clamp. **See Figure 1A, 24 and Figure 2, 50.** The air duct directs an air flow from an inlet port located near the center of the air duct to first and second exit ports located at opposite end portions of the air duct. **See Figure 1A, 18 and 20.** The condenser portion of the heat pipe is attached to the housing via the clamp. **See Figure 5, 70.** Further, the apparatus includes an air flow generator coupled to the inlet port for producing the air flow. **See Figures 1A, 1B, 16 and 17.**

In another embodiment, an apparatus for cooling an integrated circuit package assembly located within a portable computer chassis is disclosed. The apparatus includes a heat exchanger and a heat pipe. **See Figure 5, 70.** The heat exchanger includes an air duct having a thin cross-section relative to the width of the duct wherein the air duct includes a housing having first and second major internal surfaces, an array of fins disposed between the first and second surfaces, and a clamp. **See Figure 1A, 18, 20 and 24.** The housing further includes an inlet port disposed at or near a center portion of the air duct and first and second exit ports disposed at respective opposite first and second end portions of the duct. **See Figure 1A, 18 and 20.** Further, the heat exchanger includes an air flow generator coupled to the inlet port for producing a first and a second air flow. **See Figures 1A, 1B, 16 and 17.** The first air flow is directed from the inlet port to the first exit port and the second air flow is directed from the inlet port to the

second exit port. The heat pipe includes an evaporator portion and a condenser portion. The integrated circuit package is thermally coupled to the evaporator portion and the condenser portion is coupled to the housing of the air duct via the clamp. **See Figures 1A, 1B, 4 and 5.**

Yet a further embodiment discloses a portable computer having an enclosure with an air duct including a housing with internal fins and a clamp. The air duct directs an air flow from an inlet port located near the center of the air duct to first and second exit ports located adjacent opposite end portions of the air duct. The air duct haves a substantially equal width as the enclosure where the enclosure includes first, second and third sides. The portable computer also includes an air flow generator coupled to the inlet port for producing the air flow and a heat transfer means thermally coupling a heat generating component located within the enclosure to the air duct housing. The heat transfer means is coupled to the housing of the air duct via the clamp. **See Figures 1A, 1B, 4 and 5.**

A method for cooling a heat generating component located within an enclosed compartment is described. The method includes thermally coupling the heat generating component to the housing of an air duct having a thin cross-section relative to the width of the air duct by thermally coupling the component to an evaporator portion of a heat pipe and thermally coupling a condenser portion of the heat pipe to the air duct housing wherein the condenser portion of the heat pipe is physically coupled to the housing of the air duct via the clamp. **See Figure 1A and Figure 5.** The method further includes producing an air flow through the air duct by directing air external to the compartment into an inlet port located at or near the center of the air duct and splitting the air flow into a first air flow and a second air flow. The first air flow is directed to a first exit port located at a first end portion of the air duct, while the second air flow being directed to a

second exit port located at a second end portion of the air duct. **See Figures 1A, 1B, 4 and 5.**

In a further embodiment, an apparatus is disclosed having a heat pipe including an evaporator portion and a condenser portion wherein the heat pipe is coupled to a heat generating component at the evaporator portion of the heat pipe, an air duct comprising a housing. **See Figure 5, 70, 71 and 72.** The air duct directs an air flow from an inlet port, located at or near a middle of the air duct, to a first and second exit port located at opposite ends of the air duct. **See Figure 1A, 18 and 20.** The air duct is coupled to the condenser portion of the heat pipe via a clamp mounted on the housing. **See Figure 1A, 24.** The apparatus also includes an air flow generator coupled to the inlet port to produce the air flow. **See Figures 1A, 1B, 4 and 5.**

A heat exchanger is disclosed. The heat exchanger includes an air duct having a housing including an inlet port located at or near a middle of the air duct, a clamp and a first and second opposing exit ports and an air flow generator coupled to the inlet port to produce an air flow. **See Figure 1A, 16, 17 and 24.** The air flow is directed from the inlet port to the exit port. **See Figure 1A, 18 and 20.** The heat exchanger further includes a heat pipe having an evaporator portion and a condenser portion. **See Figure 5, 71 and 72.** The evaporator portion is coupled to an integrated circuit package and the condenser portion being coupled to the air duct via the clamp. **See Figures 1A, 1B, 4 and 5.**

A system is disclosed comprising an air duct housing having an inlet port located at or near a middle of the air duct and a clamp and a first and second exit port located at opposite ends of the air duct. **See Figure 1A, 16, 17 and 24.** The system also includes an air flow generator coupled to the inlet port to produce an air flow and a heat pipe

coupling a heat generating component to the air duct housing via the clamp. **See Figures 1A, 1B, 4 and 5.**

A further method is disclosed including thermally coupling a heat generating component to a housing of an air duct, thermally coupling the component to an evaporator portion of a heat pipe, and thermally coupling a condenser portion of the heat pipe to the air duct housing. **See Figure 5, 70 and 72.** The condenser portion of the heat pipe is physically coupled to the housing of the air duct via the clamp. **See Figure 1A, 24.** Additionally, the method includes producing an air flow through the air duct by directing air external into an inlet port located at or near a center point in the air duct and splitting the air flow into a first air flow and a second air flow. **See Figure 1A, 16 and 17.** The first air flow is directed to a first exit port located at a first end of the air duct and the second air flow being directed to a second exit port located at a second end of the air duct opposing the first end. **See Figure 1A, 18 and 20.**

A further apparatus is disclosed comprising a heat pipe to be coupled to a heat generating component an air duct and an air flow generator coupled to an inlet port to produce air flow. **See Figure 1A, 16 and 17.** The air duct includes a housing having internal fins wherein the air duct directs an air flow from the inlet port positioned at a central point of the air duct to first and second exit ports located at opposite end portions of the air duct. **See Figure 1A, 18 and 20.** The housing is coupled to the heat pipe via a clamp. **See Figure 1A, 24 and Figure 5, 70.**

Another embodiment of a heat exchanger is disclosed having an air duct including an inlet port situated at a central point of the air duct, first and second exit ports disposed at respective opposite first and second end portions of the duct, and a clamp. **See Figure 1A, 16, 17 and 24.** Moreover, the heat exchanger includes an air flow generator coupled

to the inlet port to produce a first and a second air flow wherein the first air flow is directed from the inlet port to the first exit port and the second air flow being directed from the inlet port to the second exit port. **See Figure 1A, 18 and 20.** A heat pipe is coupled to the housing of the air duct via the clamp. **See Figure 5, 70.**

A method is disclosed comprising thermally coupling a heat generating component to an air duct thermally coupling the component to a heat pipe, and thermally coupling the heat pipe to the air duct the heat pipe being physically coupled to the housing of the air duct via the clamp. **See Figure 1A, 24 and Figure 5, 70.** In addition, the method includes producing an air flow through the air duct by directing air external to the air duct into an inlet port situated at a central point of the air duct and splitting the air flow into a first air flow and a second air flow. **See Figure 1A, 16 and 17.** The first air flow is directed to a first exit port located at a first end portion of the air duct and the second air flow is directed to a second exit port located at a second end portion of the air duct. **See Figure 1A, 18 and 20.**

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-32, 35-42, 45-48 and 52 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement.

Claims 1-7, 9-14, 16-26, 28-32, 35-42, 45-48 and 52 stand rejected under 35 U.S.C. §102(e) as being unpatentable over *Kitahara*.

Claims 8, 15, and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Kitahara* in view of *Nelson*.

VII. ARGUMENT

1. THE PENDING CLAIMS 1-32, 35-42, 45-48 AND 52 WERE IMPROPERLY REJECTED UNDER 35 U.S.C. § 112, FIRST PARAGRRAPH BECAUSE THE SPECIFICATION AND THE FIGURES CLEARLY DISCLOSE A CLAMP

Appellant respectfully submits that the specification clearly enables the claims in the present application. FIG. 1A and the corresponding description (e.g., col. 3, ll. 9-24 of Pat. No. 5,966,286) describes an integral clamp structure 24 that is provided for attaching a heat pipe to a heat exchanger housing. Further, FIG. 5 clearly discloses another view of a heat exchanger housing having a heat pipe attached. Therefore, Appellant submits that the present specification provides a description that more than adequately enables one of ordinary skill in the art to make and use the invention as claimed without undue experimentation.

2. THE PENDING CLAIMS 1-7, 9-14, 16-26, 28-32, 35-42, 45-48 AND 52 WERE IMPROPERLY REJECTED UNDER 35 U.S.C. § 102(e) BECAUSE *KITAHARA* DOES NOT DISCLOSE OR SUGGEST A HOUSING HAVING A CLAMP TO ATTACH A HEAT PIPE TO A HOUSING

(A) Claims 1-7, 9-14, 16-26, 28-32, 35-42, 45-48 and 52 were improperly rejected because *Kitahara* does not disclose or suggest a housing having a clamp to attach a heat pipe to the housing

Claims 1-7, 9-14, 16-26, 28-32, 35-42, 45-48 and 52 recite an element that is not disclosed in *Kitahara*. For example, Appellant's independent claim 1 recites the following:

> An apparatus removing heat from a heat generating component, said apparatus comprising:
> a heat pipe comprising an evaporator portion and a condenser portion, said heat generating component being thermally coupled to said evaporator portion;
> an air duct comprising a housing having internal fins and a clamp, said air duct directing an air flow from an inlet port located near the center of said air duct to first and second exit ports located at opposite end portions of said air duct, said condenser portion of said heat pipe being attached to said housing via said clamp; and
> an air flow generator coupled to said inlet port for producing said air flow.

Appellant's independent claims 9, 16, 19, 20, 28, 35-37, 45 and 52, recite similar features to those of claim 1.

Kitahara discloses a separated heat-generating element cooling device where the heat sink is affixed on a printed circuit board adjoining a heat-generating element. A heat pipe is laid between the heat sink and the heat-generating element. The heat pipe is affixed to the top surface of the heat sink and the other end is affixed to the heat-generating element. The heat pipe is formed in a flat fork-shape branching at the heat

sink side so as to be directly struck by the cooling air from the fan unit and cool above a high heat emitting portion of the heat-generating element at the heat-generating element side. To house one end of the fork, the heat sink is formed with a space for fitting it where no pin-shaped cooling fins are provided. Fitting (56) has groves for holding the heat pipe which push the heat pipe upward. Thus, the heat-generating element side is mounted on the top surface of the heat-generating element sandwiched in between a base plate affixed using for example an adhesive with a good heat conductivity and a fixing plate screwed to the base plate (Figures 45, 46 and 49).

Appellant submits that *Kitahara* fails to disclose or suggest attaching a heat pipe to a housing via a clamp. The Examiner, however, asserts that the embodiment of *Kitahara* described with reference to Figures 44, 45 and 49 discloses a heat pipe mounted on a structure of a device via a clamp. See Final Office Action at page 5, paragraph 1. Appellant respectfully disagrees with the Examiner's assertion. *Kitahara* discloses that a fitting (56) is affixed to a heat sink (2) by fastening flanges (56c) together with a fan unit (3) to heat-radiating fins (4) or specially provided support columns positioned at four corners of the heat sink (2). Thus, the forked portion of the heat pipe (55) is sandwiched between the top surface of the heat sink (2) and the pipe holding grooves (56a). See *Kitahara* at Figure 49 and col. 23, ll. 30-43. Nevertheless, a heat pipe sandwiched between a cooling fan and radiating fins is not equivalent to a housing having a clamp to attach a heat pipe to the housing. The heat pipe in *Kitahara* slides into the space created by groves (56a) (See Fig. 49), as opposed to having a clamp to attach the heat pipe, as in claim 1.

Accordingly, independent claims 1, 9, 16, 19, 20, 28, 35-37, 45 and 52 are patentable over *Kitahara*.

Claims 2-8, 10-15, 17-18, 21-27, 29-32, 38-42 and 46-48 depend from claims 1, 9, 16, 20, 28, 37 and 45, respectively, and include additional limitations. Therefore, the invention as claimed in claims 2-8, 10-15, 17-18, 21-27, 29-32, 38-42 and 46-48 are similarly patentable over *Kitahara.*

For the forgoing reasons, Appellant submits that the Examiner has failed to search and find a printed publication or patent that discloses the claimed invention as set forth in MPEP § 706.02(a).

Thus, the Examiner erred in rejecting claims 1-7, 9-14, 16-26, 28-32, 35-42, 45-48 and 52 under 35 U.S.C. §102(e).

2. THE PENDING CLAIMS 8, 15, AND 27 WERE IMPROPERLY REJECTED UNDER 35 U.S.C. § 103(a) BECAUSE ANY COMBINATION OF *KITIHARA* AND *NELSON* DO NOT DISCLOSE OR SUGGEST A HOUSING HAVING A CLAMP TO ATTACH A HEAT PIPE TO A HOUSING

Appellant respectfully submits that the combination of *Kitahara* and *Nelson* fails to disclose or suggest the claimed invention for the reasons set forth below.

(A) Claims 8, 15 and 27 were improperly rejected because *Kitahara*, and *Nelson* do not disclose or suggest a housing having a clamp to attach a heat pipe to the housing

Claims 8, 15 and 27 are not obvious in view of *Kitahara* and *Nelson* under 35 U.S.C. §103(a). Claims 8, 15 and 27 depend from independent claims 1, 9 and 20, respectively, and necessarily include each of the features. As discussed above, nowhere does *Kitahara* disclose or suggest each and every element of the Appellant's independent claims 1, 9 and 20. For example, *Kitahara* fails to disclose or suggest a housing having a clamp to attach a heat pipe to the housing.

With respect to claims 8, 15 and 27, the Examiner states that *Nelson* discloses a resonate cantilever vibrator employed as a cooling fluid flow generator for a cooling fluid. See Final Office Action at page 5, paragraph 6. However, *Nelson* does not disclose or suggest a housing having a clamp to attach a heat pipe to the housing. Instead, *Nelson* discloses a fluid heat exchanger for cooling an electronic component including a housing having a fluid inlet and fluid outlet. See *Nelson* at Abstract. Therefore, any combination of *Kitahara* and *Nelson* would also not disclose or suggest a housing having a clamp to attach a heat pipe to the housing.

It is also respectfully submitted that *Kitahara* does not teach or suggest a combination with *Nelson* and *Nelson* does not teach or suggest a combination with *Kitahara*. It would be impermissible hindsight based on Appellant 's own disclosure to incorporate the heat-generating element cooling device in *Kitahara* and the heat exchanger having piezoelectric fan means in *Nelson*. Moreover, such a combination would still lack a housing having a clamp to attach a heat pipe to the housing.

Since the combination of *Kitahara* and *Nelson* fails to disclose all of the elements required by Appellant's independent claims 1, 9 and 20, the combination of *Kitahara* and *Nelson* fails to teach or suggest each and every element of Appellant's invention as embodied in the claims. Consequently, the Examiner has not established a prima facie case of obviousness, and the Examiner's rejection of claims 8, 15 and 27 under 35 U.S.C. §103(a) as being obvious over *Kitahara* and *Nelson* should be reversed.

VIII. CONCLUSION

Careful review of the Examiner's rejections shows that the Examiner has failed to provide any reference, or combination of references of the prior art that shows all of the elements of each appealed claim. Therefore, Appellant respectfully submits that all appealed claims in this application are patentable and were improperly rejected by the Examiner during prosecution before the United States Patent and Trademark Office. Appellant respectfully requests that the Board of Patent Appeals and Interferences overrule the Examiner and direct allowance of the rejected claims.

Appellant respectfully believes that the $500.00 to cover the appeal fee for one other than a small entity as specified in 37 C.F.R. § 1.17(c) is not necessary as it was paid on April 19, 2006 with the originally filed appeal brief. Please charge any shortages and credit any overcharges to our Deposit Account No. 02-2666.

Respectfully submitted,

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Signature 9/21/06
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IX. APPENDIX OF CLAIMS (37 C.F.R. § 41.37(c)(1)(viii))

The claims on appeal read as follows:

1. An apparatus removing heat from a heat generating component, said apparatus comprising:

a heat pipe comprising an evaporator portion and a condenser portion, said heat generating component being thermally coupled to said evaporator portion;

an air duct comprising a housing having internal fins and a clamp, said air duct directing an air flow from an inlet port located near the center of said air duct to first and second exit ports located at opposite end portions of said air duct, said condenser portion of said heat pipe being attached to said housing via said clamp; and

an air flow generator coupled to said inlet port for producing said air flow.

2. The apparatus of claim 1 wherein said heat generating component comprises an integrated circuit.

3. `The apparatus of claim 1 wherein said housing comprises a first plate and a second plate having respective first and second internal surfaces, said first internal surface having a first array of protruding members that constitute said internal fins.

4. The apparatus of claim 1 wherein said housing comprises a first plate and a second plate having respective first and second internal surfaces, said first internal surface having a first array of protruding members, said second internal surface having a second array of protruding members wherein said first and second array of protruding members constitute said internal fins.

5. The apparatus of claim 1 wherein said housing comprises a material having a high thermal conductivity.

6. The apparatus of claim 1 wherein said housing comprises aluminum.

7. The apparatus of claim 1 wherein said air flow generator comprises a fan.

8. The apparatus of claim 1 wherein said air flow generator comprises a resonate cantilever vibrator.

9. An apparatus cooling an integrated circuit package assembly located within a portable computer chassis, said apparatus comprising:

a heat exchanger comprising:

an air duct having a thin cross-section relative to the width of said duct, said air duct comprising a housing having first and second major internal surfaces, an array of fins disposed between said first and second surfaces, and a clamp, said housing further comprising an inlet port disposed at or near a center portion of said air duct and first and second exit ports disposed at respective opposite first and second end portions of said duct; and

an air flow generator coupled to said inlet port for producing a first and a second air flow, said first air flow being directed from said inlet port to said first exit port, said second air flow being directed from said inlet port to said second exit port;

a heat pipe having an evaporator portion and a condenser portion, said integrated circuit package being thermally coupled to said evaporator portion; said condenser portion being coupled to said housing of said air duct via the clamp.

10. The apparatus of claim 9 wherein said fins comprise integrally formed protruding members along said first internal surface.

11. The apparatus of claim 9 wherein said fins comprise a first and second array of protuberances integrally formed along said first and second internal surfaces, respectively.

12. The apparatus of claim 9 wherein said housing comprises a material having a high thermal conductivity.

13. The apparatus of claim 9 wherein said housing comprises aluminum.

14. The apparatus of claim 9 wherein said air flow generator comprises a fan.

15. The apparatus of claim 9 wherein said air flow generator comprises a resonate cantilever vibrator.

16. A portable computer comprising:

an enclosure having an air duct comprising a housing having internal fins and a clamp, said air duct directing an air flow from an inlet port located near the center of said

air duct to first and second exit ports located adjacent opposite end portions of said air duct, said air duct having a substantially equal width as said enclosure, said enclosure comprising first, second and third sides;

an air flow generator coupled to said inlet port for producing said air flow; and

heat transfer means thermally coupling a heat generating component located within said enclosure to said air duct housing, said heat transfer means being coupled to said housing of said air duct via the clamp.

17. The portable computer of claim 16 wherein said first and second exit ports face said first side such that said air flow leaves said enclosure from said first side.

18. The portable computer of claim 16 wherein said first and second exit ports face said second and third sides, respectively, such that said air flow leaves said enclosure from said second and third sides.

19. A method for cooling a heat generating component located within an enclosed compartment, said method comprising:

thermally coupling said heat generating component to the housing of an air duct having a thin cross-section relative to the width of said air duct, including:

thermally coupling said component to an evaporator portion of a heat pipe; and

thermally coupling a condenser portion of said heat pipe to said air duct housing, said condenser portion of said heat pipe being physically coupled to said housing of said air duct via the clamp; and

producing an air flow through said air duct by directing air external to said compartment into an inlet port located at or near the center of said air duct and splitting said air flow into a first air flow and a second air flow, said first air flow being directed to a first exit port located at a first end portion of said air duct, said second air flow being directed to a second exit port located at a second end portion of said air duct.

20. An apparatus comprising:

a heat pipe comprising an evaporator portion and a condenser portion, said heat pipe coupled to a heat generating component at the evaporator portion of the heat pipe;

an air duct comprising a housing, said air duct directing an air flow from an inlet port, located at or near a middle of the air duct, to a first and second exit port located at opposite ends of the air duct, said air duct coupled to the condenser portion of said heat pipe via a clamp mounted on the housing; and

an air flow generator coupled to said inlet port to produce the air flow.

21. The apparatus of claim 20 wherein said heat generating component is an integrated circuit.

22. The apparatus of claim 20 wherein said housing comprises a first plate and a second plate having respective first and second internal surfaces, said first internal surface having a first array of protruding members that constitute internal fins.

23. The apparatus of claim 20 wherein said housing comprises a first plate and a second plate having respective first and second internal surfaces, said first internal surface having a first array of protruding members, said second internal surface having a second array of protruding members wherein said first and second array of protruding members constitute internal fins.

24. The apparatus of claim 20 wherein said housing comprises a material having a high thermal conductivity.

25. The apparatus of claim 20 wherein said housing comprises aluminum.

26. The apparatus of claim 20 wherein said air flow generator is a fan.

27. The apparatus of claim 20 wherein said air flow generator is a resonate cantilever vibrator.

28. A heat exchanger comprising:

an air duct having a housing including an inlet port located at or near a middle of the air duct, a clamp and a first and second opposing exit ports;

an air flow generator coupled to the inlet port to produce an air flow, the air flow being directed from the inlet port to the exit port;

a heat pipe having an evaporator portion and a condenser portion, the evaporator portion coupled to an integrated circuit package, and the condenser portion being coupled

to the air duct via the clamp.

29. The heat exchanger of claim 28 wherein the air duct includes fins protruding along an internal surface.

30. The heat exchanger of claim 29 wherein the fins include a first and second array of protuberances integrally formed along a first and second internal surfaces of the air duct, respectively.

31. The heat exchanger of claim 28 wherein the air duct includes a material having a high thermal conductivity.

32. The heat exchanger of claim 28 wherein the air duct comprises aluminum.

35. A system comprising:

an air duct housing having an inlet port located at or near a middle of the air duct, a clamp and a first and second exit port located at opposite ends of the air duct;

an air flow generator coupled to the inlet port to produce an air flow; and

heat pipe coupling a heat generating component to the air duct housing via the clamp.

36. A method comprising:

thermally coupling a heat generating component to a housing of an air duct;

thermally coupling the component to an evaporator portion of a heat pipe, and

thermally coupling a condenser portion of the heat pipe to the air duct housing, said condenser portion of said heat pipe being physically coupled to said housing of said air duct via the clamp; and

producing an air flow through the air duct by directing air external into an inlet port located at or near a center point in the air duct and splitting said air flow into a first air flow and a second air flow, said first air flow being directed to a first exit port located at a first end of the air duct, said second air flow being directed to a second exit port located at a second end of the air duct opposing the first end.

37. An apparatus comprising:

a heat pipe to be coupled to a heat generating component;

an air duct comprising a housing having internal fins, said air duct directing an air flow from an inlet port positioned at a central point of the air duct, to first and second exit ports located at opposite end portions of said air duct, the housing coupled to the heat pipe via a clamp; and

an air flow generator coupled to the inlet port to produce air flow.

38. The apparatus of claim 37 wherein the heat generating component is an integrated circuit.

39. The apparatus of claim 37 wherein the housing includes a first plate and a second plate having respective first and second internal surfaces, the first internal surface having a first array of protruding members that constitute internal fins.

40. The apparatus of claim 37 wherein the housing includes a first plate and a second plate having respective first and second internal surfaces, the first internal surface having a first array of protruding members, the second internal surface having a second array of protruding members wherein the first and second array of protruding members constitute internal fins.

41. The apparatus of claim 37 wherein the housing includes a material having a high thermal conductivity.

42. The apparatus of claim 37 wherein the housing comprises aluminum.

45. A heat exchanger comprising:

an air duct having an inlet port situated at a central point of the air duct, first and second exit ports disposed at respective opposite first and second end portions of said duct, and a clamp; and

an air flow generator coupled to said inlet port to produce a first and a second air flow, said first air flow being directed from said inlet port to said first exit port, said second air flow being directed from said inlet port to said second exit port;

a heat pipe coupled to the housing of the air duct via the clamp.

46. The heat exchanger of claim 45 wherein the air duct include fins protruding along a first internal surface.

47. The heat exchanger of claim 45 wherein the housing comprises a material having a high thermal conductivity.

48. The heat exchanger of claim 45 wherein the housing comprises aluminum.

52. A method comprising:

thermally coupling a heat generating component to an air duct;

thermally coupling the component to a heat pipe, and thermally coupling the heat pipe to the air duct said heat pipe being physically coupled to said housing of said air duct via the clamp; and

producing an air flowthrough the air duct by directing air external to the air duct into an inlet port situated at a central point of the air duct ,and splitting the air flow into a first air flow and a second air flow, said first air flow being directed to a first exit port located at a first end portion of said air duct, said second air flow being directed to a second exit port located at a second end portion of said air duct.

X. EVIDENCE APPENDIX

None

XI. RELATED PROCEEDING APPENDIX

None